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CLINICOHEMATOLOGICAL STUDY OF PANCYTOPENIA IN A TERTIARY CARE HOSPITAL

Pathology

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ABSTRACT

Pancytopenia is common clinicohematological entity encountered in day to day clinical practice. Causes may be due to bone marrow failure, bone marrow infiltration, ineffective erythropoiesis or peripheral pooling/destruction of hematopoietic cells. Bone marrow is usually required to establish diagnosis. This study is aimed to identify the frequent causes in patients of pancytopenia admitted in tertiary care hospital and to determine incidence in relation to age, sex and clinicohematological correlation.

This retrospective study was done in Department of Pathology, Sassoon general hospital, Pune over a period of 2 years. Total 191 cases of bone marrow studied in patients presented with pancytopenia. Males were predominantly affected. Highest incidence of pancytopenia was found in the age group of 31-40 years. Megaloblastic anaemia (52.88%) was the commonest cause followed by dimorphic anaemia (17.28%), hypocellular marrow (12.04%) and acute leukemia (5.76%). Bone marrow examination is useful investigation to decipher the causes of pancytopenia.

KEYWORDS

Pancytopenia. Megaloblastic anaemia. Dimorphic anaemia, bone marrow.

Introduction:

Pancytopenia is a clinicohematological condition characterised by depletion of all major cell lines i.e. red blood cells, white blood cells and platelets in peripheral blood resulting in anaemia, leucopenia and thrombocytopenia respectively. An adult is pancytopenic when haemoglobin level is less than 13.3 g/dl in males or 11.5 g/dl in females, leucocyte count is less than $4X10^9$/L and platelet count is less than $150X10^9$/L.[1] The underlying mechanisms for the same are decrease in hematopoietic cell production, marrow replacement by abnormal cells, suppression of bone marrow, ineffective erythropoiesis, defective cell formation which are removed from circulation, antibody mediated sequestration or destruction of cells in overactive reticuloendothelial system.[2]

The incidence of various disorders causing pancytopenia varies in different population depending on the age, nutritional status, geographic location and prevalence of infections.[3] Pancytopenia is commonly insidious in onset. It is characterised by signs and symptoms of anaemia and thrombocytopenia. Underlying pathology determines the management and prognosis of patients.

A detailed history, physical examination, complete blood count, peripheral smear and bone marrow examination are essential to ascertain aetiology of pancytopenia. Identification of correct cause will help in implementing appropriate therapy.

Aims and objectives:

Present study was carried out to identify causes of pancytopenia, to determine its incidence in relation to age and sex and its clinicohematological correlation.

Materials and methods:

Retrospective study was carried out over a period of 2 years from January 2016 to December 2017 in Department of Pathology, B.J.G.M.C. and Sassoon General hospital, Pune. In the study period 821bone marrow were received for different haematological conditions. 191 bone marrow aspiration and biopsies performed in patients with pancytopenia were included in the study. Inclusion criteria were the presence of all three of the following.

1) Hemoglobin level less than 13.3 g/dl in males or 11.5 g/dl in females.
2) Total leucocyte count less than $4X10^9$/L.
3) Platelet count less than $150X10^9$/L.

Cases fulfilling the definition of pancytopenia but lacking representative bone marrow aspiration/biopsy were excluded from the study. Patients on radiotherapy and chemotherapy were excluded from the study. In each case Complete blood count were processed on 3 part hematology cell counter ERMA PCE 210. Bone marrow aspiration was performed using Salah needle from posterior superior iliac spine under local anaesthesia. Trephine biopsy was performed using Jamshidi needle whenever it was necessary. Bone marrow aspiration slides were stained with Leishman stain. Prussian blue stain was done to assess marrow iron stores. Reticulin stain was done in bone marrow biopsy to grade the fibrosis.

Patient data was retrieved from medical records which include age, sex, detail clinical findings, peripheral smear and bone marrow examination reports. The data retrieved was used to determine cause of pancytopenia, its incidence related to age and sex and clinicohematological correlation attempted with previous studies.

Results:

Total 821 bone marrow aspirations were received in Department of Pathology, BJGMC and Sassoon General hospital from January 2016 to December 2017. Out of them 191 cases (23.3%) showing evidence of pancytopenia were included in the present study. There were 112 males (58.6%) and 79 females (41.4%). Males were predominantly affected with male to female ratio 1.4:1.

Incidence of pancytopenia was found highest in the age group of 31-40 year

(Table no. 1). Patients age ranged from 2 years to 76 years with mean age of 39.5 years.

Table no. 1: Age distribution of patients

Age (Years)	No. of cases	Percentage (%)
1-10	02	1.04
11-20	29	15.18
21-30	30	15.71
31-40	52	27.23
41-50	29	15.18
51-60	25	13.09
61-70	18	9.42
71-80	06	3.14
Total	191	100

Most common clinical complaint was generalised weakness (86.39%) followed by dyspnoea (62.83%). Fever was present in 27.75% of pancytopenia patients. Other clinical features were bleeding, weight loss, oedema and loose motions (Table no. 2)

Table no. 2: Frequency of various signs and symptoms

Clinical features	No. of cases	Percentage (%)
Generalised weakness	165	86.39
Dyspnoea	120	62.83
Fever	53	27.25
Decreased appetite	46	24.08
Splenomegaly	33	17.28
Oedema	29	15.18
Giddiness	19	9.95
Bleeding	18	9.42
Hepatomegaly	14	7.33
Jaundice	10	5.24
Loose motion	06	3.14
Weight loss	03	1.57

The most common cause of pancytopenia in the present study was megaloblastic anaemia (52.88%) followed by dimorphic anaemia (17.28%). History of long term alcohol consumption was present in 21 patients of megaloblastic anaemia. Peripheral smear in megaloblastic anaemia showed macrocytes, macroovalocytes, hypersegmented neutrophils and Cabot rings. Bone marrow examination revealed hypercellular marrow with megaloblastic erythropoiesis and giant stab forms. Bone marrow iron was found to be raised to adequate on interpretation. hypocellular marrow was seen in 12.04% of cases. In 6 patients drug induced pancytopenia was present. The other causes of pancytopenia in the present study were reactive marrow (6.81%), Acute leukemia (5.76%), Myelofibrosis and hypersplenism (1.05%) each. One case each (0.5%) of metastasis from ovary, Myelodysplastic syndrome (MDS), Storage disorder (Gaucher's disease), lymphoma, iron deficiency anaemia and anaemia of chronic disorder. (Table no. 03)

Table no. 3: Bone marrow findings in Pancytopenia

Diagnosis	No.	Percentage
Megaloblastic anaemia	101	52.88
Dimorphic anaemia	33	17.28
Hypocellular marrow	23	12.04
Reactive marrow	13	6.81
Acute Leukemia	11	5.76
Myelofibrosis	02	1.05
Hypersplenism	02	1.05
Metastasis	01	0.5
Myelodysplastic syndrome	01	0.5
Storage disorder	01	0.5
Lymphoma	01	0.5
Iron deficiency anaemia	01	0.5
Anaemia of chronic disorder	01	0.5

Discussion:

Pancytopenia is a common haematological problem encountered in clinical practice. Underlying pathology in pancytopenia determines the management and prognosis of patients. Bone marrow is simple and safe invasive procedure and it has great utility for investigating causes of pancytopenia. In the present study maximum prevalence of pancytopenia was seen in the age group of 31-40 year (27.23%). Sharma et al[4] found similar prevalence in 31- 40 years age group. Male predominance (58.6%) was observed with male to female ratio was 1.4:1. Similarly Khunger et al[5] and Jha et al[6] found males were most commonly affected in pancytopenia patients. Most common presenting symptom was generalised weakness (86.39%) followed by dyspnoea (62.83%). Vaidya S et al[2] also reported generalised weakness (71.08%) as common presenting symptom.

Megaloblastic anaemia (52.88%) was the commonest cause of pancytopenia in the present study. Many studies in the past especially from Indian subcontinent have shown megaloblastic anaemia to be commonest cause of pancytopenia. Sharma N et al[4] studied 100 cases of pancytopenia and found megaloblastic anaemia (60%) as the commonest cause. Yadav et al[7] studied 53 cases of pancytopenia found megaloblastic anaemia as the commonest cause of pancytopenia (35.84%). Other study which was conducted in Safdarjung hospital, Delhi to ascertain cause of pancytopenia. They found megaloblastic anaemia (72%) as the most common cause of pancytopenia.[5] In the present study out of 101 cases of megaloblastic anaemia 21 patients were chronic alcoholic. Alcoholism leads to nutritional deficiency of folic acid and other vitamins.

Dimorphic anaemia was the second most common cause of pancytopenia (17.28%) in the present study. Gupta M et al[8] studied 169 patients presented with pancytopenia. They found dimorphic anaemia (15.98%) as the second most common cause of pancytopenia. Bijaya M et al[9] studied 100 cases of pancytopenia. They observed dimorphic anaemia in 24% of cases which reflects features of combination of both iron deficiency and megaloblastic anaemia in varying proportions due to nutritional deficiency.

Hypocellular marrow was found in 12.04% of cases in the present study. Bone marrow aspiration yielded dry tap in most of the cases and bone marrow biopsy was performed subsequently to confirm the diagnosis. Chandra et al[10] found 13.25% cases of hypoplastic marrow. Gupta M et al[8] found 11.2% incidence of aplastic anaemia.

Reactive marrow was seen in 6.8% cases in the present study. Gupta M et al[8] reported 5.9% of cases of pancytopenia due to infective aetiology. Devi PM et al[11] also found 6% cases of pancytopenia in HIV infected patients.

Acute leukemia was seen in 5.76% in the present study. Bone marrow was hypercellular with predominance of blast with reduced erythropoiesis and megakaryopoiesis. Gupta M et al[8] reported 12.43% cases of acute leukemia in pancytopenia patients. Arshad U et al[12] studied 330 patients of bone marrow in patients of pancytopenia. They found 4.28% cases of acute leukemia. Vaidya S et al[2] found 9.64% cases of acute leukemia in similar study. Dubey TN et al[13] reported 14.3% cases of acute leukemia in patients of pancytopenia.

Myelofibrosis and hypersplenism was uncommon cause of pancytopenia in the present study accounting for 1.05% of cases. Sharma N et al[4] showed 2% incidence of myelofibrosis in their study. Khunger JM et al[5] reported 3% incidence of hypersplenism in similar study. However Dasgupta S et al[13] reported 13.7% cases of hypersplenism in similar study.

Lymphoma, metastatic carcinoma, storage disorder, iron deficiency and anaemia of chronic disease are the least common causes of pancytopenia in the present study is comparable to other studies.[3to4,12,16]

Conclusion: Most common cause of pancytopenia in the present study is Megaloblastic anaemia followed by dimorphic anaemia. Bone marrow examination is essential to ascertain aetiology of pancytopenia. Identification of correct cause help in implementing therapy.

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